The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHIGENOBU MAEDA,
TOSHIAKI IWAMATSU and
TAKASHI IPPOSHI

Appeal No. 2005-1256
Application No. 09/988,593

ON BRIEF

Before KRASS, NASE and KRATZ, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1-9.

The invention is directed to a semiconductor device having an impurity region under an isolation region. The invention seeks to solve the prior art problem wherein source/drain impurity ions deposited in a well region, below a partial oxide film, would

change the resistance value of the body resistance of the well region. This would cause the threshold voltage of the resistor to fluctuate and cause unstable operation of the transistor.

The prior art sought to prevent the well region from being implanted with the source/drain impurity ions by increasing the thickness of the partial oxide film. This was found to leave an undesirable residue on the partial oxide film and, although this residue may be removed by etching, the increased time of etching can result in damage to a gate oxide film adjacent the partial oxide film.

The instant invention solves the fluctuating resistance problem by forming a first conductivity semiconductor region under an isolation film that at least partially has a region doped by only an impurity of a first conductivity type. It is said that since the first conductivity impurity region does not include second conductivity type impurities, the resistance value of the body resistance can be reduced and dispersion can be suppressed. Thus, a precisely controllable semiconductor device having a partially isolated body fixed semiconductor-on-insulation (SOI) structure can be obtained without increasing the resistance value of the body resistance.

Independent claim 1 is reproduced as follows:

> 1. A semiconductor device having an SOI structure formed by a semiconductor substrate <1>, an embedded insulating layer <2> and an SOI layer <3>, comprising:

a plurality of element forming regions provided in said SOI layer, each formed with a prescribed element;

an isolation film <31> provided in an upper layer part of said SOI layer for isolating said plurality of element forming regions from each other;

a first conductivity type semiconductor region <11, 12> provided under said isolation film as part of said SOI layer, said semiconductor region being formed in contact with at least one of said plurality of element forming regions having a first conductivity type among said plurality of element forming regions; and

a first conductivity type body region <10> provided in said SOI layer and capable of being externally fixed in electric potential, said body region being in contact with said semiconductor region, wherein

said semiconductor region at least partially has a first conductivity type impurity region not mixed with an impurity of a second conductivity type different from said first conductivity type but doped by only an impurity of said first conductivity type.

The examiner relies on the following reference:

Flaker et al. (Flaker)	6,410,369	Jun. 25, 2002 (filed Jun. 12, 2000)

Claims 1-9 stand rejected under 35 U.S.C. §102 (a) as anticipated by Flaker.

Reference is made to the briefs and answer for the respective positions of appellants and the examiner.

OPINION

A claim is anticipated only when a single prior art reference expressly or inherently discloses each and every element or step thereof. Constant v. Advanced Micro-Devices Inc., 848 F.2d 1560, 1570, 7 USPQ2d 1057, 1064 (Fed. Cir. 1988); RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984). If the examiner presents a reasonable basis for alleging inherency, the burden shifts to appellants to come forward, if they can, with evidence to the contrary. In re King, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986); In re Ludtke, 441 F.2d 660, 664, 169 USPQ 563, 566-67 (CCPA 1971); In re Swinehart, 439 F.2d 210, 213, 169 USPQ 226, 229 (CCPA 1971).

The examiner asserts that Flaker discloses a semiconductor device having an SOI structure formed by a semiconductor substrate, an embedded insulating layer 48 and a first conductivity type (p-) SOI layer 46. The examiner identifies a plurality of element forming regions 54, each formed with prescribed elements (Figures 8, 10, and 12); an isolation film 40 (Figure 10B) provided in an upper layer part of the SOI layer for isolating the plurality of element forming regions from each other; a first conductivity type semiconductor region (body link, Figure 10B) provided under the isolation film 40 as part of the SOI layer, with the first conductivity type body link semiconductor region

being formed in contact with at least one of the plurality of element forming regions; and a p-type body region provided in the SOI layer and capable of being externally fixed in electric potential (Figure 8). The examiner asserts that the body region is in contact with the semiconductor region, wherein the body link semiconductor structure region at least partially has a first conductivity type impurity region not mixed with an impurity of a second conductivity type different from the first conductivity type but doped by only an impurity of the first conductivity type. The examiner further asserts that the first conductivity type semiconductor region is formed in a region reaching the at least one element forming region from the body function "not to function as an element' if no wiring is formed to the n-FET. (See pages 4-5 of the answer).

Appellants contend that Flaker fails to disclose, either explicitly or inherently, the claim limitation:

> said semiconductor region at least partially has a first conductivity type impurity region not mixed with an impurity of a second conductivity type different from said first conductivity type but doped by only an impurity of said first conductivity type.

We have reviewed the evidence before us, including the arguments of appellants and the examiner, and we conclude therefrom, that the examiner has failed to present a prima facie case of anticipation. Accordingly, we will not sustain the rejection of independent claim 1, or of claims 2-9, dependent thereon, under 35 U.S.C. §102 (a).

In his explanation of the rejection, at pages 3-4 of the answer, the examiner alleges that Flaker discloses what is recited in the instant claims, but, for the most part, the examiner does not specifically identify the portions of Flaker which allegedly teach these specific limitations.

Thus, for example, at the bottom of page 3 of the answer, the examiner alleges that Flaker teaches

> ...wherein said body link semiconductor region at least partially has a first conductivity type impurity region not mixed with an impurity of a second conductivity type different from said first conductivity type but doped by only an impurity of said first conductivity type and said first conductivity type semiconductor region is formed in a region...

But the examiner points to no specific portion of Flaker which allegedly teaches that a semiconductor region at least partially has a first conductivity type impurity region not mixed with an impurity of a second conductivity type different from said first conductivity type but doped by only an impurity of said first conductivity type. Moreover, the examiner does not explain, in the rationale for the rejection, how Flaker is interpreted to find such a teaching.

When this limitation is argued by appellants, the examiner's response, at page 5 of the answer, is to point to Flaker's disclosure of a precise control of the oxidation

depth and a lack of doping of the regions under element 62, arguing that "the reference discloses that the doped region 60 are [sic] oxidized indicating that the regions under oxide 62 are not doped," pointing to column 6, lines 11-23.

The indicated portion of Flaker indicates "a selective equilibration body link", that N+ regions 60...oxidize without appreciable diffusion to form HIPOX regions 62," and that this "allows very precise control of the oxidation depth, since the oxidation rate will slow markedly when the shallow N+ region is consumed," but we find nothing indicating that a semiconductor region at least partially has a first conductivity type impurity region not mixed with an impurity of a second conductivity type different from said first conductivity type but doped by only an impurity of said first conductivity type.

When appellants point out (principal brief-page 6) that there is no necessary link between precise control of oxidation depth, as indicated by Flaker, and the claimed limitation of a region "doped by only an impurity of said first conductivity type," the examiner alleges that appellants argue inherency of regions under element 60 being doped, "but provides no reason to believe that doping as argued is inherent" (answer-page 5).

The examiner has it backwards. It is the examiner's initial burden to show a prima facie case of anticipation. Appellants have no burden to refute a case of

anticipation which has not been made. Moreover, to establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) citing Continental Can Co. v. Monsanto Co., 948 F.3d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. Id. At 1269, 20 USPQ2d at 1749 (quoting In re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981).

Basically, the examiner is charging "inherency" of a region doped by only an impurity of a first conductivity type in Flaker, and appellants refute that such is shown, or inherent, in Flaker. Accordingly, the examiner was put to his proof to provide evidence of a region doped by only an impurity of a first conductivity type in Flaker, and the examiner has offered nothing to convince us of the correctness of his position. We are unconvinced that "precise control of the oxidation depth" in Flaker (column 6, lines 18-19) is tantamount to a teaching of a region doped by only an impurity of a first conductivity type, as apparently alleged by the examiner.

Since we find no prima facie case of anticipation established by the examiner, we will not sustain the rejection of claims 1-9 under 35 U.S.C. §102 (a).

The examiner's decision in reversed.

REVERSED

ERROL A. KRASS)
Administrative Patent Judge)
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JEFFREY V. NASE) BOARD OF PATENT
Administrative Patent Judge) APPEALS
) AND
) INTERFERENCES
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PETER F. KRATZ)
Administrative Patent Judge)

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MCDERMOTT, WILL & EMERY
600 13th Street, N.W.
Washington, DC 20005-3096